#### DYNAMICS OF FISH POPULATIONS

The use of population models to predict the effect of changes in growth and mortality rates is now a well-established branch of fishery biology. The mathematical skills required to develop, select, and apply these models are, unfortunately, not possessed by all fishery biologists. This unit will keep informed on modern developments in theory, select and develop models for application to species under investigation at this laboratory, and advise the species investigations on population dynamics problems. In addition, it will advise on the proper statistical methods for experimental design and analysis.

#### DYNAMICS OF FISH POPULATIONS

# List of Projects

- 1. Assessment of mesh regulation
- 2. Growth rates of Georges Bank haddock
- 3. Population dynamics of cod
- 4. Population dynamics of redfish
- 5. Population dynamics of silver hake

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SUMMARY COI OL SCHEDULE

Investigation: Dynamics of Fish Populations Biological Leberatory: Woods Hole, Mass.

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			1 2 2 C		-	-	24	링	Years				
Project Title			Cost	52	58	59	09	) [7]	62 (	53	179	65 16	99
1. Assessment of Mesh Regulation.			74,8	6.7	5,8	6.0	3,1 7	7.2 7	7.2 9.	4	9.41	10.010	0
2. Growth Rates of Georges Bank Haddock		before & after regu-		2	9	6	1 1	8		3	9.410	0.010	0
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4. Population Dynamics of Redfish Stocks	Stocks		63.2	4	9	5.0	0	6 5	7	က	-	က	5
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				Reco	Recommented by:	ed by	••				A	Drte	
				Lab	Lab. Director Herbert W	cator	Herk	ert V	O	raham		3/6/5	6
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### U. S. Fish and Wildlife Service Bureau of Commercial Fisherics

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959
File Ne.

# Research Project Outline

Title of Proj	ect: Assessment of the e	effect of the ICNAF	mesh regulation on
	Georges Bartitle: Dynamics of	ank haddoek wielde	
	Chief: Vacant		
Project Loado	r: <u>Vacant</u> Nome	$\operatorname{Title}$	Grade
•	(Title and Grade)	11010	GI Ade
Collaborators	•		
Need for Info effect of the p	rmation: The Laboratory present and any future re	y has a commitmen egulation.	t to ICNAF to assess the
Objective: 7 regulation an	Fo measure, if possible, d to improve upon presen	the amount of ben nt statistical techni	efit resulting from mesh lque used in such analyzes.
Method of Proc	cedure: Statistical evalua the available[haddock]da	ation and population	model studies based on
*11000 L.			

Phase 2:

Dyn Fish Pops - 1 Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	Needed by Labora	tory for Complete Project	74.8
	FY <sub>1959</sub>	FY 1.960	FY_1961_
Personal Services Other Expenses:	2,6	3,1	3, 5
Within Project			70. VA.
Lab. Adm. & Ser.	3.4	100 Mar.	3. 7
Lab. Total	6.0	3.1	7.2
Regional Office Washington Office	.06	.031	.072
Total			
Recommended Source of Function . Estimated Date of Complete		egular S-K, Regular, Contributed,;Phase 2 FY;Phase 3 F	
Recommended by: Originator			Date
Investigation Chief			
Laboratory Director	Herbert W. Grah		8/6/59
Regional Director		untur	8/19/59
Branch ChiefApproved by:	1 24115		12-24-59
Division Chief for Dir	ector	1	1 1 6

### Remarks

# U. S. Fish and Wildlife Scrvice Bureau of Commercial Fisheries

Sheet No. 1

Phase 2: Prepare reports.

Location: Woods Hole, Mass. Date: August 6, 1959
File Ne.

# Research Project Outline

Title of Project	t: Growth Rate of Ge	eorges Bank haddock b	efore and after regulation
Investigation Ta	itle: Dynamics of 1	Fish Populations	
Investigation Ch			
Project Loader:	Vacant		
•		$\mathtt{Titl}\epsilon$	Grade
Assistants: (Ti	itle and Grade)		
Cellaboraters:			
Need for Informa	tion: <b>It is require</b> d	l for management of th	ne resource.
Objective: To derate of haddock.	etermine the effect o	of the ICNAF mesh reg	gulation on the growth
Method of Proced	ure:		
Phase 1: Keep un	the annual growth r der careful review.	rate data of the George	s Bank Haddock stocks

Method of Precedure: (Cent'd)

Phase 3:

Estimated Costs: Total	l Needed by Laborate	ory for Complete Project	74.7
	FY <u>1959</u>	FY 1960	FY 1961
Personal Services Other Expenses:	2.5	3.0	3 <b>. 2</b>
Within Project	1.9	***	0.1
Lab. Adm. & Ser.	1.5		3. 5
Lab. Total	5.9	3.0	6.8
Regional Office Washington Office	•059	•03	•068
Total		,	
Recommended Source of Fu	(5-	-K, Regular, Contributed,	·
Estimated Date of Comple	tion: Phase 1 FY	;Phase 2 FY ; Phase 3 F	Y Project FY 66
Recommended by: Originator	·		<u>Date</u>
Investigation Chief			
Laboratory Director	Herbert W. Greha	am .	8/6/59
Regional Director_	maple 4 Por	men ten	8/19/59
Branch Chief Approved by:	V 2416.		12-24-59
Division Chief for Dir	ector 161.621		

# Remarks

# U. S. Fish and Wildlife Scrvice Bureou of Commercial Fisheries

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File Ne.

# Research Project Outline

Title of Project: Population Dynamics of Cod St	tocks
Investigation Title: Population Dynamics	
Investigation Chief: Vacant	
Project Loader: Vacant	
	e Grade
Assistants: (Title and Grade)	
Collaborators:	
Need for Information: It is required for manager	ment of the resource.
Objective: To predict and measure the effect of n	nesh regulation on cod <b>y</b> ield <b>s.</b>
Method of Procedure: Phase 1: Application of population dynamics the	eory to the cod data

Phase 2: Prepare reports

Shcet No. 2

Filc No.:

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	Needed by Lab	oratory f	or Complete Projec	ct <u>70.5</u>
	FY <u>1959</u>		FY 1960	FY_ 1961_
Personal Services Other Expenses:	2.5		3 <b>.</b> 0	2.0
Within Project	<u> </u>			0.1
Lab. Adm. & Ser.	3.4			3.5
Lab. Total	5.9		3,0	5, 6
Regional Office Washington Office	•059		•03	.056
Total		,		
Recommended Source of Fur		•	egulor, Contributo	•
Estimated Date of Complet Recommended by: Originator	tion: Phase I_	FY ; Pha	se 2_FY;Phase	3 FY ; Project FY 664  Date
Investigation Chief				
Laboratory Director	Herbert W.	Graham		8/6/59
Regional Director	Joseph 4	Pew	initian	8/19/59
Branch Chief Approved by:	1 24	45		12-24-59
Approved by: Division Chief for Dire	ector	· H		1. A lie

Remarks

#### U. S. Fish and Wildlife Service Bureau of Commercial Fisheries

Shect Mo. 1

Location: Woods Hole, Mass. Date: August 6, 1959
File Ne.

#### Research Project Outline

Title of Project: Population Dynamics of Redfis	sh Stocks
Investigation Title: Population Dynamics	
Investigation Chief: Vacant	
Project Loader: Vacant Name Title	Grade
Assistants: (Title and Grade)	
Collaborators:	
Need for Information: Required for management	of the resource
Objective: To determine rates of growth, natural to assess the effects of fishing on redfish stocks	l and fishing mortalities in order
Method of Procedure:	

Phase 1: Calculate parameters from available data and apply population dynamics theory to these data

Phase 2: Write reports on conclusions

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	. Needed by Labor	ratory for Complete Projec	t <b>63</b> , 2
	FY 1959	FY 1960	FY 1961
Personal Services Other Expenses:	2.0	3.0	2.0
Within Project	des em		0.1
Lab. Adm. & Ser.	3.0		3,5
Lab. Total	5.0	3,0	5,6
Regional Office Washington Office	05	03	056
Total			
Recommended Source of Fu  Estimated Date of Comple		(S-K, Reguler, Contribute	,
Recommended by: Originator	olon, mase I FI	; rhase 2_ri; rhase 3	Date
Investigation Chief		·	
	Herbert W. Gre		8/6/59
Regional Director  Branch Chief	Joseph 4. J.	uparties	8/19/59
Approved by: Division Chief for Dire	ector	eft	1-4-60

Remarks

#### U. S. Fish and Wildlife Service Buresu of Commercial Fisherics

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

#### Research Project Outline

Title of Project:	Population Dynam:	ics of Silver Hake	
Investigation Tit	le: Population Dy	namics	
Investigation Chi	ef: Vacant		
Project Londor:	Vacant	Title	
Assistants: (Tit.		* TOTC	Grade
Cellaboraters:			
Need for Informat	ion: Required for r	nanagem <b>e</b> nt of the res	source.

Objective: To determine rates of growth, natural and fishing mortalities in order to assess the effects of fishing on silver hake stocks.

Method of Procedure:

Phase 1: Calculate parameters from available data and apply population dynamics theory to these data.

Phase 2: Write reports.

Dyn Fish Pops - 5 Sheet No. 2

File No.:

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	. Needed by Labora	tory for Complete Project	60.3
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	2.0	2.0	2.0
Other Expenses: Within Project			
Lab. Adm. & Ser.	3,0		3.4
Lab. Total	5.0	2.0	5, 4
Regional Office Washington Office	05	92	.054
Total			
Recommended Source of Fu	(	S-K, Regular, Contributed,	·
Estimated Date of Comple	tion: Phase 1 FY	Phase 2 FY; Phase 3 F	Project IY 66#
Recommended by: Originator			<u>Date</u>
Investigation Chief			
Laboratory Director	Herbert W. Grah		8/6/59
Regional Director_	Joseph F. J	univeler	8/19/59
Branch Chief	1 2448	£,	12-24-59
Approved by: Division Chief for Dir	ector	(	104 62

### Remarks